
केबल प्रबंधन के लिए कन्ड्यूट प्रणालियाँ

भाग 21 विशेष अपेक्षाएँ — कठोर कन्ड्यूट प्रणालियाँ

Conduit Systems for Cable Management

Part 21 Particular Requirements Rigid Conduit Systems

ICS 29.120.10

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भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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FOREWORD

This Indian Standard (Part 21) was adopted by the Bureau of Indian Standards, after the draft finalized by the Electric Wiring Accessories Sectional Committee had been approved by the Electrotechnical Division Council. This standard (Part 21) specifies requirements for rigid conduit systems. The other parts in the series are:

- Part 1 General requirements
- Part 22 Particular requirements — Pliable conduit systems
- Part 23 Particular requirements — Flexible conduit systems
- Part 24 Particular requirements — Conduit systems buried under ground

In the preparation of this standard, considerable assistance has been derived from IEC 61386-21 : 2002 Conduit systems for cable management — Part 21 Particular requirements- Rigid conduit systems, issued by International Electrotechnical Commission (IEC) with following modifications:

- a) Reference temperature has been changed
- b) Referred to standards have been changed

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values or analysis (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***CONDUIT SYSTEMS FOR CABLE MANAGEMENT****PART 21 PARTICULAR REQUIREMENTS RIGID CONDUIT SYSTEMS****1 SCOPE**

This clause of IS 16205 (Part 1) is applicable, except as follows:

Addition:

This part of IS 16205 specifies the requirements for rigid conduit systems.

2 NORMATIVE REFERENCES

This clause of IS 16205 (Part 1) is applicable.

3 DEFINITIONS

This clause of IS 16205 (Part 1) is applicable.

4 GENERAL REQUIREMENTS

This clause of IS 16205 (Part 1) is applicable.

5 GENERAL CONDITIONS FOR TESTS

This clause of IS 16205 (Part 1) is applicable.

6 CLASSIFICATION

This clause of IS 16205 (Part 1) is applicable, except as follows:

6.1.1 1, 6.1.2 1, 6.1.3 2, 6.1.3 3, 6.1.3 4, 6.1.4 1 and 6.1.5 1 are not applicable.

NOTE — Rigid conduit systems according to **6.1.1 2** and **6.1.2 2** and classification IX from **6.2.1, Table 1** are not allowed in France.

7 MARKING AND DOCUMENTATION

This clause of IS 16205 (Part 1) is applicable, except as follows:

Addition:

7.101 The conduit shall be marked in accordance with 7.1 of IS 16205 (Part 1) along its entire length at regular intervals of preferably 1 m but not longer than 3 m and each length shall be marked at least once.

Compliance is checked by inspection.

7.102 The manufacturer shall document for the system the minimum inside diameter and the classification in accordance with 6.

Compliance is checked by inspection.

8 DIMENSIONS

Replacement:

8.1 Threads and outside diameters shall comply with IS 14763.

Compliance is checked by means of the gauges specified in IS 14763.

8.2 Threadable conduits and threadable conduit fittings, except terminating conduit fittings, shall comply with Table 1. Non-threadable conduit fittings, except fittings which are part of a conduit system declaring tensile strength, shall comply with Table 2. The minimum inside diameter of the conduit system shall be as declared by the manufacturer. Compliance is checked by measurement.

Table 1 Thread Lengths

(Clause 8.2)

S1 No.	Size	External Thread Minimum Length mm	Internal Thread Minimum Length mm
(1)	(2)	(3)	(4)
i)	6	05.5	06.5
ii)	8	06.5	07.5
iii)	10	08.5	09.5
iv)	12	10.5	11.5
v)	16	12.5	13.5
vi)	20	14.0	15.0
vii)	25	17.0	18.0
viii)	32	19.0	20.0
ix)	40	19.0	20.0
x)	50	19.0	20.0
xi)	63	19.0	20.0
xii)	75	19.0	20.0

Table 2 — Maximum Entry Diameter and Minimum Entry Length Details

(Clause 8.2)

S1 No.	Size	External Thread Minimum Length mm	Internal Thread Minimum Length mm
(1)	(2)	(3)	(4)
i)	6	0.5	06.0
ii)	8	08.5	08.0
iii)	10	10.5	10.0
iv)	12	12.5	12.0
v)	16	16.5	16.0
vi)	20	20.5	20.0
vii)	25	25.5	25.0
viii)	32	32.6	30.0
ix)	40	40.7	32.0
x)	50	50.8	42.0
xi)	63	63.9	50.0
xii)	75	75.9	50.0

9 CONSTRUCTION

This clause of IS 16205 (Part 1) is applicable.

10 MECHANICAL PROPERTIES

This clause of IS 16205 (Part 1) is applicable, except as follows:

10.4 Bending Test

Replacement:

Conduits which are declared by the manufacturer as being bendable are tested in accordance with 10.4.1, 10.4.2 or 10.4.3.

10.4.1 Metallic Conduits

10.4.1.1 Conduit sizes 16, 20 and 25 are subjected to a bending test by means of the apparatus shown

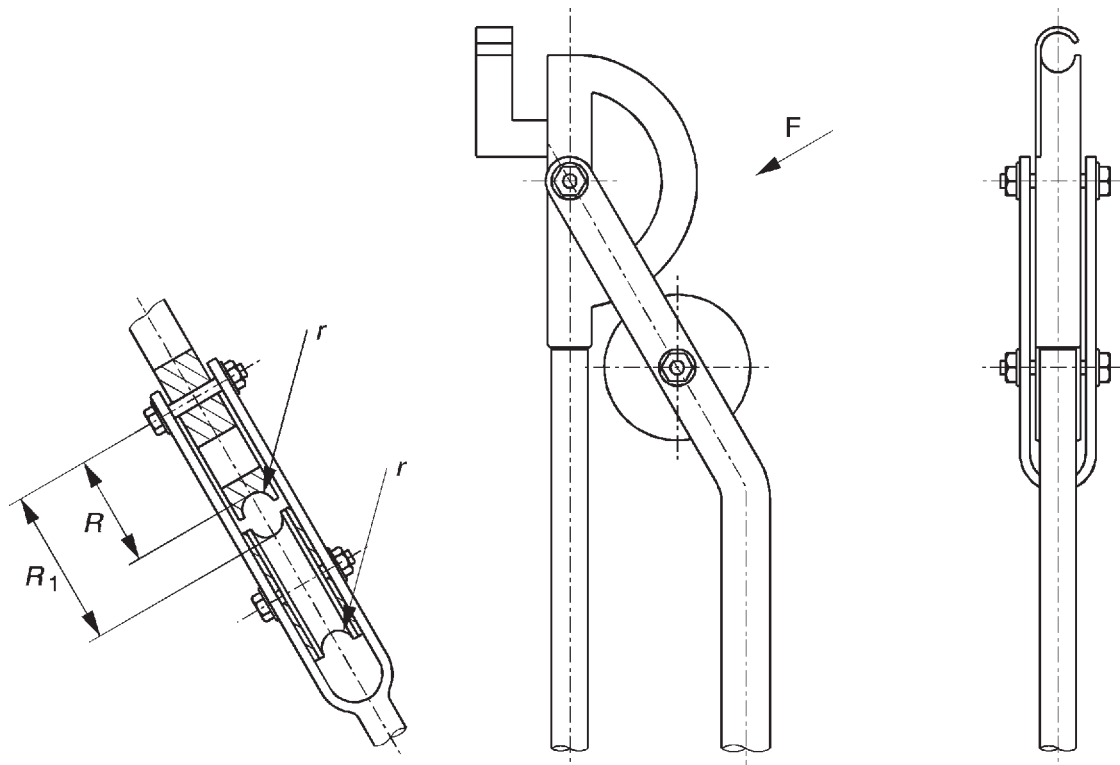
in Fig. 1. Testing of other sizes is in accordance with the manufacturer's instructions.

10.4.1.2 Samples having a length equal to 30 times the nominal diameter, are bent so that when released, they have an angle of $(90 \pm 5)^\circ$, so that the inside radius of the bend is equal to six times the nominal diameter.

10.4.1.3 For conduits with welded seams, six samples are tested, three with the seam on the outside of the bend, three with the seam on the side.

10.4.1.4 After the test:

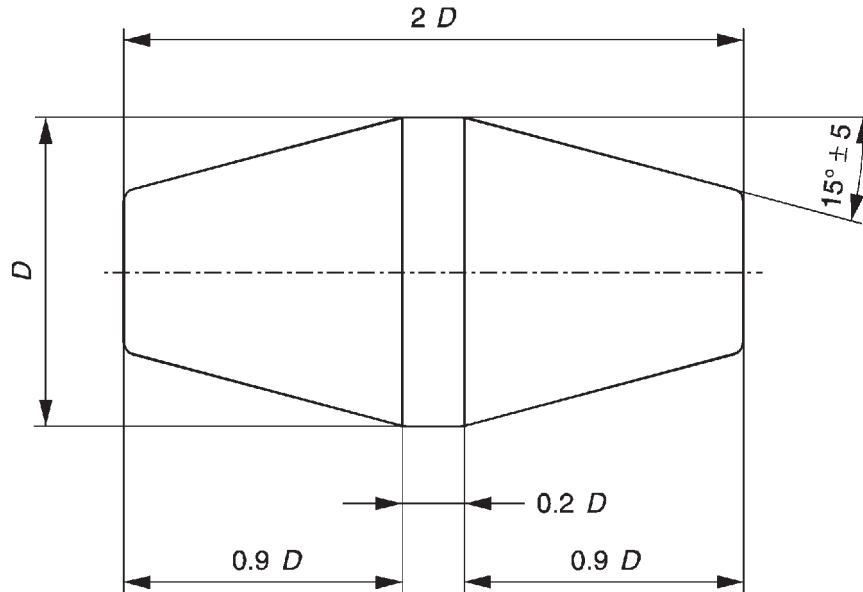
- The basic material of the conduits and the protective coating of the conduits shall show no cracks visible to normal or corrected vision without magnification;



Sl No.	Size	Bending Radius		Radius of Groove <i>r</i> mm
		Inside Radius <i>R</i> mm	Outside Radius <i>R</i> ₁ mm	
(1)	(2)	(3)	(4)	(5)
i)	16	96	113	8.1
ii)	20	120	141	10.1
iii)	25	150	178	12.7

NOTE — This drawing is not intended to govern design except as regards the dimensions shown.

FIG. 1 BENDING APPARATUS FOR METALLIC AND COMPOSITE CONDUITS



D	80 percent of the manufacturer's declared minimum inside diameter of the conduit system
Material	Steel, hardened and polished, edges slightly rounded
Manufacturing tolerance	$+0.05$ 0 mm
Tolerance and axial dimension	± 0.2 mm
Admissible wear	0.01 mm

NOTE — The drawing is not intended to govern design except as regards the dimensions shown

FIG. 2 GAUGE FOR CHECKING THE MINIMUM INSIDE DIAMETER OF THE CONDUIT SYSTEM AFTER IMPACT, BENDING, COLLAPSE AND RESISTANCE TO HEAT TESTS

- b) Seams, if any, shall not have opened;
- c) The section of the conduit shall not have distorted unduly.

The distortion of the section is checked as follows:

When the bent conduit is held in such a position that the straight portions are at an angle of approximately 45° to the vertical, one end of the sample pointing upwards and the other downwards, it shall be possible to pass the appropriate gauge as shown in Fig. 2 through the sample under its own weight and without any initial speed.

10.4.2 Non-metallic Conduits

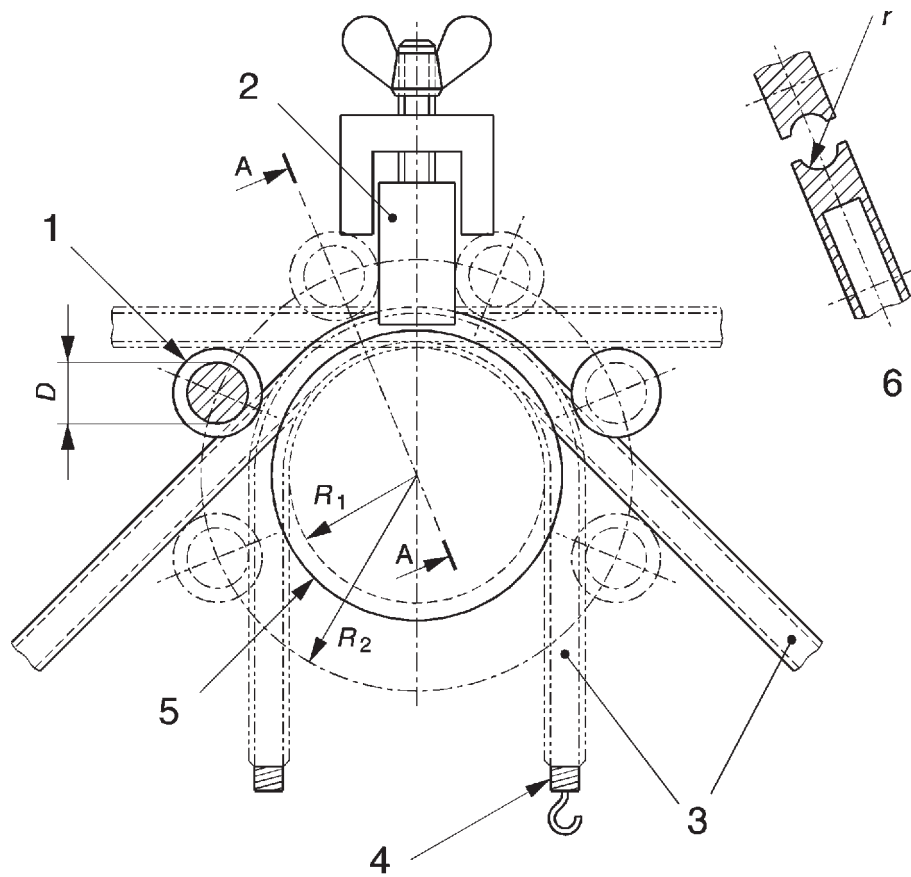
10.4.2.1 Conduit sizes 16, 20 and 25 are subjected to a bending test by means of the apparatus shown in Fig. 3. The length of the sample is approximately 500 mm. Testing of other sizes is in accordance with the manufacturer's instructions.

10.4.2.2 A bending aid, in the form of a coiled spring of square section metal wire, without burrs and having an overall diameter between 0.7 mm and 1.0 mm less than the specified minimum inside diameter of the conduit, or a bending aid recommended by the manufacturer, is inserted into each sample before bending.

10.4.2.3 Before the test, the sample with the bending aid inserted is conditioned for at least 2 h in a refrigerator within which the temperature is maintained at the declared temperature as given in table 1 with a tolerance of $\pm 2^\circ\text{C}$.

The bending apparatus is placed beside the refrigerator and the test is carried out within 10 s after the removal of the sample from the refrigerator.

10.4.2.4 Each sample is placed in position as shown in Fig. 3, and held lightly in the groove of the former by means of the clamp. The sample is bent round the

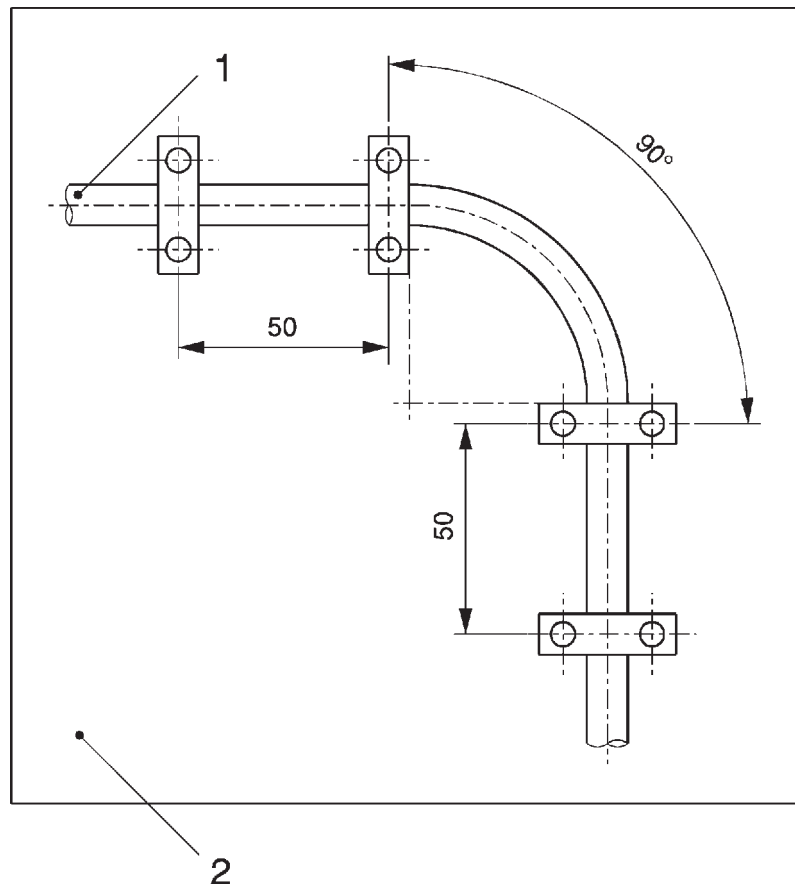
**Key**

- 1 Bending roller
- 2 Clamp
- 3 Sample
- 4 Bending spring
- 5 Former
- 6 Section A – A

Sl No.	Size	Radius to Bottom of Groove of Former R_1 mm	Radius of Arc Traced out by Centre of Bending Roller R_2 mm	Radius of Groove of Former and Bending Roller r mm	Diameter to Bottom of Groove of Bending Roller D mm
(1)	(2)	(3)	(4)	(5)	(6)
i)	16	48	84	8.1	24
ii)	20	60	105	10.1	30
iii)	25	75	131.25	12.6	37.5

NOTE — This drawing is not intended to govern design except as regards the dimensions shown.

FIG. 3 BENDING APPARATUS FOR NON-METALLIC AND COMPOSITE CONDUIT

**Key:**

- 1 Sample
2 Rigid Support

NOTE — This drawing is not intended to govern design except as regards the dimensions shown.

FIG. 4 ARRANGEMENT FOR COLLAPSE TEST

former by moving the bending rollers so that, when released, it has an angle of $(90 \pm 5)^\circ$. In this position, it shall be possible to remove the bending aid without damage to the sample or the aid.

After the test, the sample shall show no cracks visible to normal or corrected vision without magnification and it shall be possible to pass the appropriate gauge, as shown in Fig. 2, through the sample under its own weight and without any initial speed.

10.4.3 Composite Conduits

Composite conduits which are declared by the manufacturer as being bendable are tested both in accordance with 10.4.1 and 10.4.2, using new samples for each test.

The test is carried out at the declared temperature as given in Table 1 with a tolerance of $\pm 2^\circ\text{C}$.

10.5 Flexing Test

This subclause of IS 16205 (Part 1) is not applicable.

10.6 Collapse Test

Replacement:

10.6.1 Metallic Conduits

Metallic conduits are not subjected to a collapse test.

10.6.2 Non-metallic and Composite Conduits

10.6.2.1 Conduits which are declared by the manufacturer as being bendable shall be tested in accordance with 10.4.2 with the exception of 10.4.2.3.

10.6.2.2 The samples are fixed to a rigid support by means of four straps, as shown in Fig. 4, after having removed the bending spring or any other bending aids recommended by the manufacturer.

The support with the sample in position is kept for $24\text{ h} \pm 15\text{ min}$ in a heating cabinet at the declared temperature as given in Table 2 with a tolerance of $\pm 2^\circ\text{C}$.

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After this period, with the support in such a position that the straight portions of the sample are at an angle of approximately 45° to the vertical, one end of the sample pointing upwards and the other downwards, it shall be possible to pass the appropriate gauge, as shown in Fig. 2, through the sample under its own weight and without any initial speed.

10.7 Tensile Strength

This subclause of IS 16205 (Part 1) is applicable, except as follows:

10.7.1 Not applicable.

11 ELECTRICAL PROPERTIES

The clause 11.1.4 of IS 16205 (Part 1) is applicable.

12 THERMAL PROPERTIES

This clause of IS 16205 (Part 1) is applicable, except as follows:

12.3 Replacement:

The load is then removed and immediately after its removal it shall be possible to pass the appropriate gauge, as shown in Fig. 2, through the conduit under its own weight and without any initial speed, with the sample in the vertical position.

13 FIRE HAZARD

This clause of IS 16205 (Part 1) is applicable.

14 EXTERNAL INFLUENCES

This clause of IS 16205 (Part 1) is applicable.

15 ELECTROMAGNETIC COMPATIBILITY

This clause of IS 16205 (Part 1) is applicable.

Annex A (normative)

This annex of IS 16205 (Part 1) is applicable

Annex B (normative)

This annex of IS 16205 (Part 1) is applicable

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Amendments Issued Since Publication

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